

What is claimed is:

1. A thin-film magnetic head comprising:

a recording head section having a recording head and
a first medium facing surface that faces toward a

5 recording medium; and

a reproducing head section having a reproducing head
and a second medium facing surface that faces toward the
recording medium, wherein

the recording head section and the reproducing head
10 section are bonded to each other so that the first medium
facing surface and the second medium facing surface are
continuous.

2. A thin-film magnetic head according to claim 1,

15 wherein:

the recording head section includes a recording head
section body for accommodating the recording head, the
recording head section body having the first medium facing
surface and a back surface located on the opposite side
20 from the first medium facing surface;

the recording head has a conductor that is exposed
in the back surface and electrically connected to an
external device, and an induction-type electromagnetic
transducer electrically connected to the conductor;

25 the induction-type electromagnetic transducer has: a
thin-film coil electrically connected to the conductor;

first and second pole portion layers opposed to each other and disposed near the first medium facing surface; a magnetic-path-forming part that is disposed so as to surround a part of the thin-film coil and couples the
5 first pole portion layer and the second pole portion layer to each other; and a gap part provided between the first and second pole portion layers;

each of the first and second pole portion layers has a protrusion for defining a recording track width, the
10 protrusion having an end surface exposed in the first medium facing surface; and

the thickness of each of the first and second pole portion layers defines a throat height.

15 3. A thin-film magnetic head according to claim 1, wherein:

the reproducing head section includes a reproducing head section body for accommodating the reproducing head, the reproducing head section body having the second medium
20 facing surface and a back surface located on the opposite side from the second medium facing surface; and

the reproducing head has a conductor that is exposed in the back surface and electrically connected to an external device, and a magnetoresistive element that is
25 disposed near the second medium facing surface and electrically connected to the conductor.

4. A method of manufacturing a thin-film magnetic head comprising: a recording head section having a recording head and a first medium facing surface that faces toward a recording medium; and a reproducing head section having a reproducing head and a second medium facing surface that faces toward the recording medium, wherein the recording head section and the reproducing head section are bonded to each other so that the first medium facing surface and the second medium facing surface are continuous, the method comprising the steps of:

- fabricating the recording head section;
- fabricating the reproducing head section separately from the recording head section; and
- bonding the recording head section and the reproducing head section to each other.

5. A method of manufacturing a thin-film magnetic head according to claim 4, wherein: the step of fabricating the recording head section includes the step of forming a plurality of recording heads on a first wafer; and the step of fabricating the reproducing head section includes the step of forming a plurality of reproducing heads on a second wafer.

6. A method of manufacturing a thin-film magnetic head according to claim 4, wherein:

the recording head section includes a recording head section body for accommodating the recording head, the recording head section body having the first medium facing surface and a back surface located on the opposite side
5 from the first medium facing surface;

the step of fabricating the recording head section includes the steps of: forming a conductor that is exposed in the back surface and electrically connected to an external device; and forming an induction-type
10 electromagnetic transducer having: a thin-film coil electrically connected to the conductor; first and second pole portion layers opposed to each other and disposed near the first medium facing surface; a magnetic-path-forming part that is disposed so as to surround a part of
15 the thin-film coil and couples the first pole portion layer and the second pole portion layer to each other; and a gap part provided between the first and second pole portion layers,

each of the first and second pole portion layers has
20 a protrusion for defining a recording track width, the protrusion having an end surface exposed in the first medium facing surface; and

the thickness of each of the first and second pole portion layers defines a throat height.

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7. A method of manufacturing a thin-film magnetic

head according to claim 4, wherein:

the reproducing head section includes a reproducing head section body for accommodating the reproducing head, the reproducing head section body having the second medium facing surface and a back surface located on the opposite side from the second medium facing surface; and

the step of fabricating the reproducing head section includes the steps of: forming a conductor that is exposed in the back surface and electrically connected to an external device; and forming a magnetoresistive element that is disposed near the second medium facing surface and electrically connected to the conductor.

8. A thin-film magnetic head comprising: a conductor that is electrically connected to an external device; an induction-type electromagnetic transducer electrically connected to the conductor; and a body for accommodating the conductor and the induction-type electromagnetic transducer, wherein:

the body has a medium facing surface that faces toward a recording medium, and a back surface located on the opposite side from the medium facing surface;

the conductor is exposed in the back surface;

the induction-type electromagnetic transducer is stacked on the conductor;

the induction-type electromagnetic transducer has: a

thin-film coil electrically connected to the conductor;
first and second pole portion layers opposed to each other
and disposed near the medium facing surface; a magnetic-
path-forming part that is disposed so as to surround a
5 part of the thin-film coil and couples the first pole
portion layer and the second pole portion layer to each
other; and a gap part provided between the first and
second pole portion layers;

each of the first and second pole portion layers has
10 a protrusion for defining a recording track width, the
protrusion having an end surface exposed in the medium
facing surface; and

the thickness of each of the first and second pole
portion layers defines a throat height.

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SUSA 31 9. A method of manufacturing a thin-film magnetic
head comprising: a conductor that is electrically
connected to an external device; an induction-type
electromagnetic transducer electrically connected to the
20 conductor; and a body for accommodating the conductor and
the induction-type electromagnetic transducer, wherein the
body has a medium facing surface that faces toward a
recording medium, and a back surface located on the
opposite side from the medium facing surface, and the
25 conductor is exposed in the back surface, the method
comprising the steps of:

forming the conductor; and

forming the induction-type electromagnetic transducer to be stacked on the conductor, the electromagnetic transducer having: a thin-film coil
5 electrically connected to the conductor; first and second pole portion layers opposed to each other and disposed near the first medium facing surface; a magnetic-path-forming part that is disposed so as to surround a part of the thin-film coil and couples the first pole portion
10 layer and the second pole portion layer to each other; and a gap part provided between the first and second pole portion layers,

each of the first and second pole portion layers having a protrusion for defining a recording track width,
15 the protrusion having an end surface exposed in the medium facing surface, and the thickness of each of the first and second pole portion layers defining a throat height.

10. A slider for a thin-film magnetic head
20 comprising:

a slider section having a recording head and a first medium facing surface that faces toward a rotating recording medium; and

a reproducing head section having a reproducing head
25 and a second medium facing surface that faces toward the recording medium, wherein:

the first medium facing surface has concavities and convexities for controlling the orientation of the slider section while the recording medium is rotating, and

the slider section and the reproducing head section
5 are bonded to each other so that the first medium facing surface and the second medium facing surface are continuous.

11. A slider for a thin-film magnetic head according
10 to claim 10, wherein the recording head includes an induction-type electromagnetic transducer, and the reproducing head includes a magnetoresistive element.

12. A slider for a thin-film magnetic head according
15 to claim 10, wherein the first medium facing surface has a first surface closer to the reproducing head section, a second surface farther from the reproducing head section, and a border portion between the first surface and the second surface, the first surface and the second surface
20 being slanted with respect to each other such that the first and second surfaces make a convex shape bent at the border portion.

13. A slider for a thin-film magnetic head according
25 to claim 12, wherein, while the recording medium is rotating, at least either the first surface or the second

surface slants with respect to the surface of the recording medium such that the smaller the distance from a point in at least either the first or second surface to the border portion, the smaller the distance from said
5 point to the recording medium.

14. A slider for a thin-film magnetic head according to claim 12, wherein the slider section is in contact with the surface of the recording medium while the recording
10 medium is at rest, and is off the surface of the recording medium while the recording medium is rotating.

15. A slider for a thin-film magnetic head according to claim 14, wherein, when the slider section comes into
15 contact with the surface of the recording medium, the border portion is the first to make contact with the surface of the recording medium.

16. A slider for a thin-film magnetic head according
20 to claim 14, wherein, when the slider section takes off from the surface of the recording medium, the border portion is the last to depart from the surface of the recording medium.

25 17. A slider for a thin-film magnetic head according to claim 12, wherein, regardless of whether the recording

medium is rotating or at rest, the slider section is in contact with the surface of the recording medium at the border portion, and the first surface and the second surface slant with respect to the surface of the recording
5 medium.

18. A slider for a thin-film magnetic head according to claim 12, wherein the first medium facing surface has a recess formed in a region including the border portion.

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19. A method of manufacturing a slider for a thin-film magnetic head, the slider comprising: a slider section having a recording head and a first medium facing surface that faces toward a rotating recording medium; and
15 a reproducing head section having a reproducing head and a second medium facing surface that faces toward the recording medium, wherein the first medium facing surface has concavities and convexities for controlling the orientation of the slider section while the recording
20 medium is rotating, and the slider section and the reproducing head section are bonded to each other so that the first medium facing surface and the second medium facing surface are continuous, the method comprising the steps of:

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fabricating the slider section;

fabricating the reproducing head section separately

from the slider section; and

bonding the slider section and the reproducing head section to each other.

5 20. A method of manufacturing a slider for a thin-film magnetic head according to claim 19, wherein the recording head includes an induction-type electromagnetic transducer, and the reproducing head includes a magnetoresistive element.

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 21. A method of manufacturing a slider for a thin-film magnetic head according to claim 19, wherein: the step of fabricating the slider section includes the step of forming a plurality of recording heads on a first
15 wafer; and the step of fabricating the reproducing head section includes the step of forming a plurality of reproducing heads on a second wafer.

 22. A method of manufacturing a slider for a thin-film magnetic head according to claim 19, wherein:
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 the step of fabricating the slider section includes the steps of: forming a plurality of recording heads and a plurality of first medium facing surfaces on a first wafer to thereby form a first slider section aggregate including
25 a plurality of slider sections arranged in a plurality of rows; and cutting the first slider section aggregate to

thereby form a second slider section aggregate including a plurality of slider sections arranged in a row;

the step of fabricating the reproducing head section includes the steps of: forming a plurality of reproducing
5 heads on a second wafer to thereby form a first reproducing head section aggregate including a plurality of reproducing head sections arranged in a plurality of rows; and cutting the first reproducing head section aggregate to thereby form a second reproducing head
10 section aggregate including a plurality of reproducing head sections arranged in a row; and

the step of bonding the slider section and the reproducing head section to each other includes the step of bonding the second slider section aggregate and the
15 second reproducing head section aggregate to each other to thereby fabricate a slider aggregate including a plurality of sliders arranged in a row,

the method further comprising the step of cutting the slider aggregate into a plurality of sliders separated
20 from one another.

23. A method of manufacturing a slider for a thin-film magnetic head according to claim 19, further comprising the step of lapping the first medium facing
25 surface and the second medium facing surface so as to flatten the first and second medium facing surfaces, after

the step of bonding the slider section and the reproducing head section to each other.

24. A method of manufacturing a slider for a thin-
5 film magnetic head according to claim 19, further
comprising, after the step of bonding the slider section
and the reproducing head section to each other, the step
of lapping the first medium facing surface so as to allow
the first medium facing surface to have a first surface
10 closer to the reproducing head section, a second surface
farther from the reproducing head section, and a border
portion between the first and second surfaces, and to
allow the first and second surfaces to slant with respect
to each other such that the first and second surfaces make
15 a convex shape bent at the border portion.

25. A method of manufacturing a slider for a thin-
film magnetic head according to claim 24, further
comprising the step of forming a recess in a region
20 including the border portion in the first medium facing
surface.

26. A method of manufacturing a slider for a thin-
film magnetic head according to claim 19, wherein the
25 slider section and the reproducing head section are bonded
to each other using a ceramic-based adhesive in the step

of bonding the slider section and the reproducing head section to each other.

27. A method of manufacturing a slider for a thin-
5 film magnetic head according to claim 19, wherein, in the step of bonding the slider section and the reproducing head section to each other, a thermosetting adhesive is put between the slider section and the reproducing head section, and the adhesive is cured by heating at a
10 temperature of 300°C or less to thereby bond the slider section and the reproducing head section to each other.

28. A method of manufacturing a slider for a thin-film magnetic head according to claim 19, wherein:

15 the step of fabricating the slider section includes the steps of: forming a plurality of recording heads on one surface of a wafer; and removing the wafer by grinding the wafer from the other surface thereof; and

the recording head each have a conductor that is
20 exposed in a surface resulting from the grinding and electrically connected to an external device.

29. A method of manufacturing a slider for a thin-film magnetic head according to claim 28, wherein, in the
25 step of removing the wafer, the wafer is ground from the other surface thereof with a support plate placed on the

plurality of recording heads.

30. A method of manufacturing a slider for a thin-film magnetic head according to claim 19, wherein the step
5 of fabricating the reproducing head section includes the steps of: forming a plurality of reproducing heads on one surface of a wafer; and removing at least part of the wafer by grinding the wafer from the other surface thereof.

10 31. A method of manufacturing a slider for a thin-film magnetic head according to claim 30, wherein, in the step of bonding the slider section and the reproducing head section to each other, a surface of the reproducing head section opposite to the surface resulting from the
15 grinding is bonded to the slider section.

~~SUB A 47~~ 32. A method of manufacturing a slider of a thin-film magnetic head according to claim 30, wherein, in the step
20 of removing the wafer, the wafer is ground from the other surface thereof with a support plate placed on the plurality of reproducing heads.